

REMARKS

Claims 1-5, all the claims pending in the application, stand rejected. Applicants have amended claims 1-3 and 5.

Specification

The Examiner objects to the specification because at page 6, the discussion of Table 2 includes a statement which reads "at a surface free energy equal to or greater than 60 mJ/m^2 ... the occurrence of fusion increased remarkably." The Examiner observes that this statement runs counter the data presented in Table 2 and the assertions made in the remainder of the disclosure.

Applicants agree that the Examiner is correct. The word "increased" has been changed to "decreased."

Claim Rejections - 35 U.S.C. § 102

Claims 1 and 2 are rejected under 35 U.S.C. § 102(b) as being anticipated by Fujino (4,976,764). This rejection is traversed for at least the following reasons.

In the technical background of the invention, as described at page 1, mold pressing of optical glass elements is described and the problem with a reaction that takes place at the interface of the glass and the mold due to fusion of glass to the mold surface is identified, specifically, fogging, clouding and cracking. As explained, this problem occurs when 1,000 or more cycles of continuous molding are conducted with a single mold.

The present invention solves this problem by adopting a method in which a preformed glass material having a surface free energy of greater than or equal to 60 mJ/m^2 is fed to a heat softening step and then fed to the press molding step. The preformed glass material is "washed" to achieve a surface free energy of greater than or equal to 60 mJ/m^2 .

Moreover, as now claimed, the preformed glass is treated in "lots." Each lot of preformed glass is subjected to precision cleaning followed by sampling inspection of surface

free energy. Only lots with a minimum surface free energy of greater than or equal to 60mJ/m² are fed to the heat softening step.

This feature of the invention is particularly effective for glass materials tending to fuse, such as optical glasses with fluorophosphate, phosphate, borate and borophosphate materials having high reactivity with a molding surface.

Claim 1

Claim 1 is directed to such method of manufacturing a glass article comprising the steps of (1) heat softening the glass material that has been preformed, (2) press molding the glass material with a pressing mold. Claim 1 is further limited by the present amendment to a method in which each lot of preformed glass material is subjected to precision cleaning, a cleaned lot of glass material is subjected to sampling inspection of a surface free energy, and a lot with minimum surface free energy levels of greater than or equal to 60 mJ/m² is fed to the heat softening step.. The present amendment is supported by the description on page 10, lines 21 to 30.

Fujino

The Fujino reference concerns a method of producing a molded glass article, particularly one where the glass is a lead oxide-containing glass material. As explained at col. 1, in the Background of the Invention, the lead oxide in the glass material is reduced at the glass surface to become other lead compounds or metallic lead. As a result, the molded glass article gets cloudy.

Thus, a solution taught in Fujino is to subject the surface of the glass material to an oxidation treatment with activated oxygen ion, such as (1) an oxygen plasma action technique, (2) an ion bombarding technique or (3) an ion showering technique, as explained at col. 2. This prevents a reduction reaction of lead oxide on the glass surface, even when press molding in a reducing atmosphere at a temperature of the glass softening point or above. Fujino asserts that the molded product is free of surface cloudiness and there is no adhesion of lead to the surface of the mold.

The Examiner points to the disclosure at col. 3, lines 1-2 and asserts that the glass samples, whose surface was to be subjected to an oxygen plasma action treatment, were first "thoroughly cleaned by ultrasonic cleaning", as explained at col. 3, lines 1-2. Further, the Examiner points to the teaching at col. 2, lines 2-6 of an oxidation treatment of the surface of the glass material with activated oxygen ions. This follows with the step of press molding at elevated temperatures in a nitrogen atmosphere to obtain the molded glass article, as explained at col. 4, lines 1-3.

The Examiner points to the Applicants' own disclosure at page 8, lines 9-10 that a glass material with a surface free energy of greater than or equal to 60 mJ/m^2 can be obtained by precision cleaning. The Examiner also notes that the dry methods of oxygen decomposition may be obtained by oxygen plasma treatment. Thus, using Applicants' own definition, the Examiner concludes that Fujino's approach is intended to yield a glass material for press molding that has a surface free energy greater than or equal to 60 mJ/m^2 .

Notwithstanding these observations, Fujino does not teach or suggest the lot-based steps now set forth in the claim. This alone is a basis for patentability.

Also, there is no teaching or suggestion in Fujino that a surface free energy greater than the stated threshold would be obtained. In the absence of such teaching, for anticipation, the feature must be "inherent." For inherency, there must be no other alternative result.

The law is clear that a single prior art reference anticipates a patent claim if it expressly or inherently describes each and every limitation set forth in the patent claim. *Verdegaal Bros., Inc. v. Union Oil Co.*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). Inherent anticipation requires that the missing descriptive material is "necessarily present," not merely probably or possibly present, in the prior art. *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999) (citing *Continental Can Co. USA, Inc. v. Monsanto Co.*, 948 F.2d 1264, 1268, 20 USPQ2d 1746, 1749 (Fed. Cir. 1991)).

Applicants submit that such limitation is not taught and would not be inherent, since the process in Fujino can result in glass material that has a surface free energy less than 60 mJ/m².

Claim 2

Claim 2 depends from claim 1 and has been amended to state that the achievement of the threshold surface free energy value is kept in an atmosphere that is actually operative to maintain such surface free energy from after cleaning until the start of the heat softening step. This amendment is made in view of the amendment of claim 1 and in order to make clear the starting point at which the cleaned preformed glass material is kept in an atmosphere that maintains a surface free energy of greater than or equal to 60 mJ/m².

Clearly, nothing of this sort is taught in Fujino. On the basis of the foregoing argument and amendment, and the dependency of claim 2 from claim 1, this rejection should be overcome.

Claims 3, 4 and 5 are rejected under 35 U.S.C. § 102(b) as being anticipated by Sato (5,851,252). This rejection is traversed for at least the following reasons.

Claim 3

The subject matter of claim 3 is a method of manufacturing a glass article comprising heat softening the glass material that has been preformed and press molding of the preform glass material with a pressing mold, where a surface layer is formed on a preform glass material having a surface free energy of greater than or equal to 60 mJ/m². Thereafter, the preformed glass material is fed to the heat softening step and the press molding step.

As with claim 1, claim 3 is further limited by the present amendment to a method in which each lot of preformed glass material is subjected to precision cleaning, a cleaned lot of glass material is subjected to sampling inspection of a surface free energy, and a lot with minimum surface free energy levels of greater than or equal to 60 mJ/m² has a surface layer formed thereon, prior to being fed to the heat softening step. The amendment is supported by the description on page 11, lines 18 to 28.

Thus, for at least two reasons, the claim is not anticipated, or even obvious in view of Sato.

Claim 4

Claim 4 specifies that the thin film is composed primarily of carbon with a film thickness of greater than or equal to 0.1 nm and less than or equal to 1 micrometer. This claim would be patentable for reasons given for claim 3.

Claim 5

Claim 5 has been amended to specifies that the preform glass material is washed to achieve the surface energy and kept in an atmosphere that actually "maintains" a surface free energy of greater than or equal to 60 mJ/m^2 until the surface layer is formed. This makes it clear that the atmosphere is consistently maintained, rather than simply being "capable of maintaining" the surface energy value.

In addition, Applicants modified claim 5 in view of the amendment of claim 3 in order to make clear the starting point at which the cleaned preformed glass material is kept in an atmosphere that maintains a surface free energy of greater than or equal to 60 mJ/m^2 .

Finally, the claim would be patentable for reasons given with respect to claim 3.

Sato et al

The patent to Sato et al concerns a method of forming a mold release film on the surface of a glass blank from which an optical element is made by press molding, the film being a carbon film having a thickness of less than 50 \AA , preferably less than 10 \AA . In forming the film, a glass blank is subject to ashing with an **oxygen plasma** so as to remove organic dirt attached to the glass blank. Then, plasma cleaning with an **argon plasma** is effected so as to remove inorganic dirt attached to the glass blank. Thereafter, the glass blank is subjected to **methane plasma** processing such that a carbon film having a thickness of less than 50 \AA is formed on the surface of the glass blank, as taught in the patent and summarized in the Abstract.

The Examiner points to the teaching at col. 3, lines 17-29 for a description of the ashing technique using an oxygen plasma, and asserts that this cleaning method is capable of producing a surface free energy greater than or equal to 60 mJ/m^2 , glass material. The Examiner points to the teachings with regard to the use of methane plasma to deposit carbon film at col. 3, lines 41-50 and to the use of inductive heating and press molding of a preform thereafter.

Again, there is no express teaching in Sato that the glass material preform with deposited surface layer has a surface free energy greater than or equal to 60 mJ/m^2 . Such feature is not "inherent," notwithstanding the application of such cleaning and forming steps, because the disclosed process is not capable of producing such result or can produce other results.

Further, Sato does not teach the subject matter presently recited in the claims, including the treatment of the performs in lots in the cleaning, sampling and forming steps.

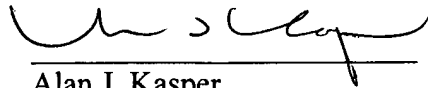
With regard to claim 5, the Examiner notes that Sato teaches the glass material is to be exposed to an argon plasma atmosphere prior to forming the carbon surface layer. The Examiner asserts that the environment for argon ion etching would provide an atmosphere capable of maintaining a free surface energy greater than or equal to the value set forth in the claim until the surface layer is formed. As previously noted, the claim makes it clear that the atmosphere is consistently maintained, rather than simply being "capable of maintaining" the surface energy value.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

Amendment Under 37 C.F.R. § 1.111
U.S. Application No. 10/658,466

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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